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BETTER GINNING WITH HIGHER GIN-SAW SPEEDS

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All new cotton gin installations in the United States establish the operation of their gin saws at speeds of 600 to 700 revolutions per minute in order to provide for looser seed rolls and smoother ginned lint, as contrasted with slower saw speeds of 400 to 500 revolutions per minute which are still used in many of the older designs of gins. A check on seed roll densities in about 100 new gins in the Cotton Belt revealed that 96 of those visited were being operated with loose seed rolls and were attaining good ginning, top capacity and cleanly ginned seed at an average saw speed of 660 revolutions per minute. Of the five hundred gins selected and studied by the U. S. Cotton Ginning Laboratory as being representative of gins in operation from 1 to 20 years or more, over one-third were found to employ medium to tight seed rolls in efforts to obtain either desired ginning capacity or satisfactory seed cleaning. Unfortunately, this practice frequently causes some sacrifice in quality of ginned lint.

The studies of variations in gin-saw speed and seed-roll density at the U. S. Cotton Ginning Laboratory in 1940 indicate that the higher speeds now being provided for by the manufacturers on the new gins are optimum for ginning quality and efficiency. With loose seed rolls, the tests showed that more than a bale per hour per stand could be ginned. Ginning preparation was generally smooth when the cotton was in suitable condition for ginning; that is, brought to the gin naturally dry or when dried sufficiently by passing through driers. However, even with the newer designs of gins in a good state of repair and operating with higher saw speeds, dense seed rolls will be the result when the gins are fed beyond normal ginning capacity.

The damage will be still more noticeable with the older gins that operate with slow saw speeds and that have been neglected so far as repairs of important parts are concerned, when they are operated to give a capacity comparable to that of new gins. Their capacity will be further lowered by allowing the saw teeth to become badly worn or off pitch, or the brushes to get into bad shape or in improper adjustment, or the airblast system to become run down and out of order. It has also been found in

laboratory and field tests that the practice of operating with slow saw speeds is equally, if not more, responsible for rough ginning in some instances than poor condition of the gins, when dense seed rolls are resorted to by the ginner in order to obtain satisfactory ginning capacity.

Data compiled from studies of seed roll density and gin saw speed in 500 commercial gins across the Cotton Belt show a direct and very significant relationship between these two factors -- the percentage of gins operating with loose seed rolls increasing gradually with definite increases in their gin-saw speed.1/ Only 42 per cent of the gins operating with saws in the speed range of 450 revolutions per minute and below employed loose seed rolls as compared to 87 per cent for those running at speeds above 650 revolutions per minute.

Tests made at the U. S. Cotton Ginning Laboratory over a period of years on about 100 cottons varying widely in staple length, foreign matter, moisture and other conditions and qualities showed that by increasing the saw speed from 400 to 600 revolutions per minute in ginning with loose seed rolls, the average increase in ginning capacity amounted to 20 per cent for both long and short-staple cotton. There was an average increase in bale weight of 20 pounds for long-staple and 15 pounds for short-staple cotton; and an average increase in bale value of $2.50 on long-staple and about $1.50 on short-staple cottons.

Ginners are finding that increased saw-speeds are worthwhile because they pay dividends comparable to those indicated in the Laboratory investigations. The speed of the gin saws of 9 per cent of the 500 commercial gins surveyed by the Laboratory in 1940 was stepped up last fall for an average of 102 revolutions per minute or from 440 to 542 revolutions per minute. The expense cost of the new pulleys needed in making the changes seldom exceeds $20 per gin stand. When the feeders and picker rollers are driven from the saw shaft in either direct-connected or independent saw-and-brush drives, their speed will be in proportion to saw speed increases; but in direct-connected drives other units may also be involved, such as fans, condenser, distributor, separator and press pump. In either case, therefore, the feeder pulleys and other machine pulleys must be replaced with larger ones in order to retain the original speeds of everything but the saws. The picker rollers, however, can usually stand increases in saw speeds of up to 100, and in some cases more, revolutions per minute without needing larger driven pulleys.

With independent saw and brush drives, the line shaft is generally operated at about 400 revolutions per minute. If the saws are running at this speed, both the driving and driven pulleys will be the same size, possibly 24 inches in diameter. To increase the saw speed to 600 revolutions per minute, the driven pulley on the saw shaft would be reduced one-third in size, or to 16 inches. Of course, the driving pulleys on the line shaft can be increased in size to produce the same saw speed increases, but changes there also involve longer belts and are more expensive than on the saw shaft. When saw speeds are stepped up in brush gins, the brush speed

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1/ See figure 1.

RELATIONSHIP OF SEED ROLL DENSITY TO GIN-SAW SPEED OF REPRESENTATIVE COMMERCIAL GINS IN THE UNITED STATES, SEASON 1940.

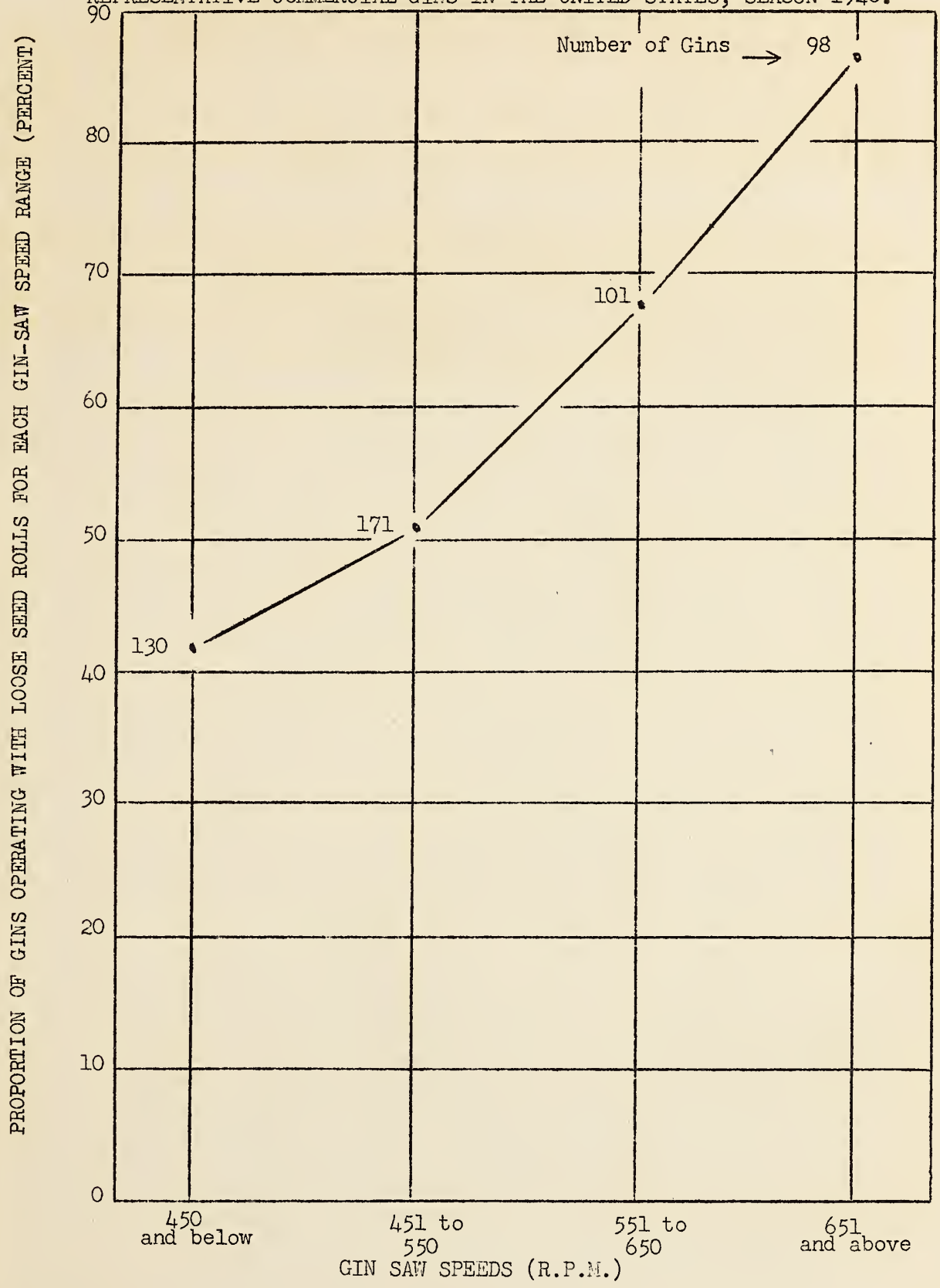

FIGURE 1.

should not be changed. If the brushes are belted separately to the line shaft, their speed will be unchanged. However, if each is driven from its own saw cylinder, a larger pulley or other alteration will be required to bring them back to their original speed. If the gin is of the air-blast type, the same nozzle pressure as employed before the saw speed increase should be maintained; namely, from 11 to 13 inches of water gauge pressure.

One important precaution to take in making saw-speed increases is to be assured that the saw-cylinder bearings will stand the increased speed. Anti-friction bearings in place of the old flat babbitted bearings are generally required, especially if the saw-speed increase is in excess of 100 revolutions per minute. If the new saw-shaft bearings are required, the total cost of the change-over to higher speeds, involving new pulleys and bearings, will probably approximate $40 per gin stand.